

CLAIMS

1. Apparatus, comprising:

an implantable annuloplasty structure comprising:

a primary body portion; and

a contracting member having (1) a first portion extending along a longitudinal length of the primary body portion of the annuloplasty structure, and (2) a second portion extending away from the primary portion of the annuloplasty structure;

at least one fastener configured to surround the contracting member, the fastener comprising a clamping structure that:

(a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the contracting member passed therethrough, and

(b) can be flexed to an open state through which the contracting member can move;

a stop removably coupled to the fastener and configured to maintain the fastener in the open state; and

a severing tool comprising:

a static cutting element having a first cutting surface; and

a dynamic cutting element having a second cutting surface that opposes the first cutting surface; and

one or more graspers configured to pull the stop proximally and remove the stop from the fastener, wherein:

a portion of the contracting member passes through the static cutting element and through the dynamic cutting element, and

once pulled proximally, the stop contacts the cutting element and is configured to push against and move the dynamic cutting element with respect to the static cutting element in order to facilitate severing of the contracting member.

2. The apparatus according to claim 1, wherein the first and second cutting surfaces are each concave.

3. The apparatus according to claim 1, wherein the first and second cutting surfaces are each diagonal.

4. The apparatus according to claim 1, wherein the severing tool is arranged such that the severing tool provides a safety mechanism whereby movement of the dynamic cutting element with respect to the static cutting element is possible only with pushing of the stop against the dynamic cutting element.

5. The apparatus according to claim 1, further comprising a housing that houses the fastener and the stop, and wherein the severing tool is coupled to the housing as the graspers grasp the stop.

6. The apparatus according to claim 5, wherein the severing tool is configured to deliver the housing, the fastener, and the stop to the implantable annuloplasty structure.

7. The apparatus according to claim 5, wherein the implantable annuloplasty structure comprises the housing.

8. The apparatus according to claim 1, wherein the stop is shaped so as to define an overhang, and wherein the graspers are configured to grip the overhang in order to initially couple the severing tool to the fastener.

9. The apparatus according to claim 8, further comprising an outer sleeve portion configured to surround the graspers in order to lock the graspers with respect to the overhang.

10. Apparatus for use with a wire, the apparatus comprising:
a fastener configured to receive the wire therethrough such that the fastener surrounds the wire, the fastener comprising a clamping structure that:

(a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the wire passed therethrough, and

(b) can be flexed to an open state through which the wire can move;

a stop removably coupled to the fastener and configured to maintain the fastener in the open state; and

a severing tool comprising:

a cutting element configured to cut the wire; and

one or more graspers configured to engage the stop and to pull the stop proximally and remove the stop from the fastener such that:
the fastener transitions toward the closed state, and
the stop pushes against and moves the cutting element in a manner that severs
5 the wire.

11. The apparatus according to claim 10, wherein the severing tool is arranged such that the severing tool provides a safety mechanism whereby movement of the cutting element is possible only with pushing of the stop against the cutting element.

12. The apparatus according to claim 10, further comprising a housing that houses the fastener and the stop, and wherein the severing tool is coupled to the housing as the graspers grasp the stop.

13. The apparatus according to claim 12, further comprising an implantable annuloplasty structure, wherein the severing tool is configured to deliver the housing, the fastener, and the stop to the implantable annuloplasty structure.

14. The apparatus according to claim 12, further comprising an implantable annuloplasty structure, wherein the implantable annuloplasty structure comprises the housing.

15. The apparatus according to claim 10, wherein the stop is shaped so as to define an overhang, and wherein the graspers are configured to grip the overhang in order to initially couple the severing tool to the fastener.

16. The apparatus according to claim 15, further comprising an outer sleeve portion configured to surround the graspers in order to lock the graspers with respect to the overhang.

17. A system, comprising:
an implant comprising a contracting member;
at least one contracting-member-fastener configured to surround the contracting member, the contracting-member-fastener comprising a clamping structure that (a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to

clamp onto the contracting member passed therethrough, and (b) can be flexed to an open state through which the contracting member can move;

a stop removably coupled to the contracting-member-fastener and configured to maintain the contracting-member-fastener in the open state; and

a severing tool comprising a cutting element configured to cut the contracting member;

wherein when pulled proximally, the stop contacts the cutting element and is configured to push against and move the cutting element in order to facilitate severing of the contracting member by the cutting element.

18. The system according to claim 17, wherein the severing tool is arranged such that the severing tool provides a safety mechanism whereby movement of the cutting element is possible only with pushing of the stop against the cutting element.

19. The system according to claim 17, further comprising a housing that houses the fastener and the stop, and wherein the severing tool is coupleable to the housing.

20. The system according to claim 19, wherein the implant is an implantable annuloplasty structure, and wherein the severing tool is configured to deliver the housing, the fastener, and the stop to the implantable annuloplasty structure.

1. —Apparatus, comprising:

an implantable annuloplasty structure comprising:

a primary body portion; and

a contracting member having (1) a first portion extending along a longitudinal length of the primary body portion of the annuloplasty structure, and (2) a second portion extending away from the primary portion of the annuloplasty structure; and a contracting member uptake tool comprising:

a primary tube terminating at a distal end portion of the contracting member uptake tool, the distal end portion of the contracting member uptake tool having a distal tip;

a secondary tube disposed alongside the primary tube, the secondary tube having a secondary tube lumen being configured for passage therethrough of the contracting member; and

- ~~a contracting member snare comprising a distal snare portion and an elongate flexible body portion coupled to the distal snare portion, the distal snare portion being configured to ensnare a portion of the contracting member and being sized to pass through the secondary tube lumen of the secondary tube in order to pull the second portion of the contracting member through a length of the secondary tube.~~
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2. ~~—The apparatus according to claim 1, wherein the distal snare portion is configured to pull the second portion of the contracting member through the distal tip of the contracting member uptake tool and subsequently through the length of the secondary tube.~~
3. ~~—The apparatus according to any one of claims 1-2, wherein the contracting member snare comprises a wire having a diameter of 0.2-0.25 mm.~~
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4. ~~—The apparatus according to any one of claims 1-3, wherein the primary tube is flexible, and wherein the secondary tube is flexible.~~
5. ~~—The apparatus according to any one of claims 1-4, wherein the annuloplasty structure defines a partial annuloplasty ring structure.~~
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6. ~~—The apparatus according to any one of claims 1-5, wherein the secondary tube is shaped so as to define a longitudinal slit.~~
7. ~~—The apparatus according to any one of claims 1-6, wherein the contracting member uptake tool comprises a handle portion and wherein the first and second tubes are connected to the handle portion.~~
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8. ~~—The apparatus according to claim 7, wherein the handle portion comprises:~~
~~a contracting member uptake device configured to uptake successive portions of the contracting member; and~~
~~a tension meter configured to measure a degree of tension of the contracting member.~~
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9. ~~—The apparatus according to claim 8, wherein the contracting member uptake device is actuatable to increase tension of the contracting member.~~
10. ~~—The apparatus according to claim 8, wherein the contracting member uptake device comprises a knob coupled to a proximal portion of the contracting member, the knob being configured to increase tension of the contracting member by pulling the contracting member proximally.~~
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11. — The apparatus according to claim 10, wherein the contracting member uptake device comprises a wheel having a groove configured to couple the contracting member to the wheel.

12. — The apparatus according to claim 11, wherein the groove is shaped so as to receive a middle portion of the contracting member.

13. — The apparatus according to any one of claims 1-12, wherein the secondary tube lumen of the secondary tube is sized so as to maintain coupling between the distal snare portion and the contracting member.

14. — The apparatus according to claim 13, wherein the snare portion comprises a flexible loop, and wherein the secondary tube lumen is configured to collapse the loop around the contracting member as the elongate flexible body portion is pulled through the secondary tube lumen.

15. — The apparatus according to any one of claims 1-14, wherein at least the distal snare portion of the contracting member snare is corrugated to increase friction between the snare portion and the contracting member.

16. — The apparatus according to any one of claims 1-15, wherein the distal snare portion is configured pull the second portion of the contracting member through an entire length of the secondary tube.

17. — The apparatus according to any one of claims 1-16, wherein the contracting member uptake tool comprises:

at least one contracting member fastener disposed within the distal end portion of the contracting member uptake tool, the contracting member fastener comprising a clamping structure that (a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the contracting member passed therethrough, and (b) can be flexed to an open state through which the contracting member can move; and

a stop removably coupled to the contracting member fastener and configured to maintain the contracting member fastener in the open state.

18. — The apparatus according to claim 17, wherein the at least one contracting member fastener comprises at least first and second contracting member fastener disposed within the distal end portion of the contracting member uptake tool.

19.—The apparatus according to claim 18, wherein the distal snare portion and the elongate flexible body portion of the contracting member snare are sized to pass distally through the contracting member fastener in the open state, the snare portion being adapted to capture and pull the contracting member proximally through the contracting member fastener and through aligned ports in the distal end portion of the contracting member uptake tool.

20.—The apparatus according to claim 19, wherein the contracting member uptake tool comprises a fastener ejector movable within the distal end portion of the contracting member uptake tool, and wherein movement of the fastener ejector contacts and converts the contracting member fastener from the open state to the closed state to clamp onto the contracting member passed therethrough.

21.—The apparatus according to claim 20, wherein the fastener ejector is coupled to the stop and moves the stop that is removably coupled to the fastener.

22.—The apparatus according to any one of claims 20-21, wherein the distal end portion of the contracting member uptake tool is shaped so as to define a sharp edge, and wherein the contracting member is disposed in proximity to the sharp edge such that movement of the fastener ejector against the sharp edge severs the contracting member extending through the fastener.

23.—The apparatus according to any one of claims 1-22, further comprising:

at least one contracting member fastener configured to surround the contracting member, the contracting member fastener comprising a clamping structure that (a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the contracting member passed therethrough, and (b) can be flexed to an open state through which the contracting member can move; and

a stop removably coupled to the contracting member fastener and configured to maintain the contracting member fastener in the open state.

24.—The apparatus according to claim 23, wherein the tool comprises a moveable cutting element having a sharp edge, and movement of the stop hammers the stop against the moveable cutting element such that movement of the moveable cutting element severs the contracting member extending through the fastener and through the moveable cutting element.

25. — The apparatus according to any one of claims 1-24, further comprising a lock slidable along the contracting member, the lock being fixedly couplable to the contracting member in order to prevent movement of the contracting member, wherein:

the lock is shaped so as to define a slit which extends from a proximal surface of the lock toward a distal surface of the lock,

the lock defines a lock lumen of the lock extending from a proximal opening in the lock toward a distal opening in the lock,

the lock lumen is configured to surround the contracting member, and

when the lock is compressed, the slit enables the lock to close around the contracting member and thereby lock the lock to the contracting member.

26. — The apparatus according to claim 25, wherein the annuloplasty structure is shaped so as to define a recess dimensioned so as to compress the lock when the lock is disposed at least in part within the recess.

27. — The apparatus according to claim 26, wherein the recess is dimensioned so as to compress the lock when the lock is disposed at least in part within the recess.

28. — The apparatus according to claim 25, wherein the lock lumen is shaped so as to define a distal portion that is wider than a proximal portion of the lock lumen.

29. — The apparatus according to claim 28, wherein the recess is shaped so as to define a proximal portion that is narrower than any other portion of the recess distal to the proximal portion.

30. — The apparatus according to claim 25, wherein the lock is disposed within the distal end portion of the contracting member uptake tool.

31. — The apparatus according to claim 30, wherein when the contracting member uptake tool is coupled to the annuloplasty structure, the lock is disposed at least in part within the recess.

32. — The apparatus according to claim 30, wherein when the contracting member uptake tool is coupled to the annuloplasty structure, the lock is disposed entirely proximally to the recess.

33. — The apparatus according to claim 25, wherein the lock is disposed within the distal end portion of the contracting member uptake tool.

34. — The apparatus according to claim 33, wherein the distal snare portion and the elongate flexible body portion of the contracting member snare are sized to pass distally through lock, the snare portion being adapted to capture and pull the contracting member proximally through the lock and through aligned ports in the distal end portion of the contracting member uptake tool.

35. — Apparatus, comprising:

an implantable annuloplasty structure comprising: _____

a primary body portion; and

a contracting member having (1) a first portion extending along a longitudinal length of the primary body portion of the annuloplasty ring structure, and (2) a second portion extending away from the primary body portion of the annuloplasty ring structure;

a housing configured to be positionable against the primary body portion of the annuloplasty ring structure;

a contracting member fastener disposed at least in part within the housing, the contracting member fastener comprising a clamping structure that (a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the contracting member passed therethrough, and (b) can be flexed to an open state through which the contracting member can move;

a stop removably coupled to the fastener and configured to maintain the contracting member fastener in the open state; and

a fastener ejector engageable with the stop such that movement of the fastener ejector moves the stop removably coupled to the fastener and converts the clamping structure from the open state to the closed state to clamp onto the contracting member passed therethrough.

36. — The apparatus according to claim 35, wherein the fastener ejector is shaped such that movement thereof facilitates severing of the contracting member extending through the fastener.

37. — The apparatus according to claim 35, wherein the fastener comprises a deformable element having a slanted state and a straight state, wherein the stop is configured to maintain the fastener in the slanted state, and wherein, upon removal of the stop, the fastener is configured to transition to the straight state and clamp the contracting member between the fastener and a surface of the housing.

38. — ~~The apparatus according to claim 37, wherein the fastener is shaped so as to define a plurality of teeth configured to increase friction between the contracting member and the fastener.~~

39. — ~~A system, comprising:~~

5 ~~an implantable annuloplasty structure comprising:~~

~~a primary body portion; and~~

~~a contracting member extending at least partially along a longitudinal length of the primary body portion of the annuloplasty structure; and~~

~~a contracting member uptake tool comprising:~~

10 ~~a tube having a lumen configured for passage therethrough of the contracting member; and~~

~~a contracting member snare comprising a distal snare portion and an elongate flexible body portion coupled to the distal snare portion, the distal snare portion being configured to ensnare a portion of the contracting member and pull it into the lumen.~~

15 40. — ~~The system according to claim 39, wherein the distal snare portion is configured to pull the portion of the contracting member through an entire length of the lumen.~~

41. — ~~The system according to claim 39, wherein the tube is flexible.~~

42. — ~~The system according to any one of claims 39-41, wherein the contracting member uptake tool comprises a handle portion and wherein the tube is connected to the handle portion.~~

43. — ~~The system according to claim 42, wherein the handle portion comprises:~~

~~a contracting member uptake device configured to uptake successive portions of the contracting member; and~~

~~a tension meter configured to measure a degree of tension of the contracting member.~~

44. — ~~The system according to claim 43, wherein the contracting member uptake device is actuatable to increase tension of the contracting member.~~

45. — ~~The system according to any one of claims 43-44, wherein the contracting member uptake device comprises a wheel having a groove configured to couple the contracting member to the wheel.~~

46. — The system according to claim 45, wherein the groove is shaped so as to receive a middle portion of the contracting member.

47. — The system according to any one of claims 39-46, wherein the lumen of the tube is sized so as to maintain coupling between the distal snare portion and the contracting member.

48. — The system according to any one of claims 39-47, wherein the distal snare portion comprises a flexible loop, and wherein the lumen is configured to collapse the loop around the contracting member as the portion of the contracting member is pulled through the lumen.

49. — The system according to any one of claims 39-48, wherein at least the distal snare portion of the contracting member snare is corrugated to increase friction between the snare portion and the contracting member.

50. — The system according to any one of claims 39-49, wherein the distal end portion of the contracting member uptake tool is shaped so as to define a sharp edge, and wherein the contracting member uptake tool is configured to dispose the contracting member in proximity to the sharp edge such that the sharp edge can sever the contracting member.

51. — The system according to any one of claims 39-50, wherein the contracting member uptake tool comprises:

a contracting member fastener disposed within the distal end portion of the contracting member uptake tool, the contracting member fastener comprising a clamping structure that (a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the contracting member passed therethrough, and (b) can be flexed to an open state through which the contracting member can move; and

a stop removably coupled to the contracting member fastener and configured to maintain the contracting member fastener in the open state.

52. — The system according to claim 51, wherein the distal snare portion and the portion of the contracting member are sized to pass distally through the contracting member fastener in its open state, the distal snare portion being adapted to capture and pull the portion of the contracting member proximally through the contracting member fastener and through aligned ports in the distal end portion of the contracting member uptake tool.

53. — The system according to claim 52, wherein the contracting member uptake tool comprises a fastener ejector movable within the distal end portion of the contracting member uptake tool, and wherein movement of the fastener ejector contacts and can convert

~~the contracting member fastener from its open state to its closed state to clamp onto the contracting member when passed therethrough.~~

~~54.—The system according to claim 53, wherein the fastener ejector is coupled to the stop and moves the stop that is removably coupled to the fastener.~~

5 ~~55.—Apparatus, comprising:~~

~~an implantable annuloplasty structure comprising:~~

~~a primary body portion having a lateral wall; and~~

~~a contracting member having (1) a first portion extending along a longitudinal length of the primary body portion of the annuloplasty structure, and (2) a second portion extending away from the primary body portion of the annuloplasty structure, the contracting member being configured to adjust a perimeter of the annuloplasty structure,~~

~~the primary body portion of the annuloplasty structure being shaped to define a recess having a recess axis, the recess extending from an opening in a first surface of the lateral wall of the primary body portion toward an opposite second surface of the lateral wall of the primary body portion, the lateral wall of the primary body portion extending away from the recess along a longitudinal axis that is at a non-zero angle with respect to the recess axis, the contracting member extending through the recess and away from the primary body portion of the annuloplasty structure via the recess; and~~

~~a lock slidable along the contracting member and toward the recess, the lock being fixedly couplable to the contracting member in order to prevent movement of the contracting member, the recess being shaped so as to facilitate fixed coupling of the lock to the contracting member.~~

25 ~~56.—The apparatus according to claim 55, wherein the lock is disposable at least in part within the recess.~~

~~57.—The apparatus according to claim 55, wherein the annuloplasty structure comprises a partial annuloplasty ring structure.~~

30 ~~58.—The apparatus according to any one of claims 55-57, wherein the lock is configured to lock the contracting member when the lock is moved at least in part within the recess.~~

59.—The apparatus according to any one of claims 55-57, wherein the lock is configured to fit entirely within the recess.

60.—The apparatus according to any one of claims 55-59, wherein:

the primary body portion comprises a housing,

the housing defines at least a portion of the lateral wall, and

the housing defines the recess.

61.—The apparatus according to any one of claims 55-60, wherein the lock is shaped so as to define a lock threaded portion, and wherein the annuloplasty structure is shaped so as to define an annuloplasty structure threaded portion configured to engage with the lock threaded portion.

62.—The apparatus according to any one of claims 55-61, wherein the recess defines a recess lumen extending along the recess axis.

63.—The apparatus according to claim 62, wherein the recess axis is disposed at the non-zero angle.

64.—The apparatus according to any one of claims 55-63, wherein:

the lock is shaped so as to define a slit which extends from a proximal surface of the lock toward a distal surface of the lock,

the lock defines a lock lumen of the lock extending from a proximal opening in the lock toward a distal opening in the lock,

the lock lumen is configured to surround the contracting member, and

when the lock is disposed within the recess, the slit enables the lock to close around the contracting member and thereby lock the lock to the contracting member.

65.—The apparatus according to claim 64, wherein the recess is dimensioned so as to compress the lock when the lock is disposed at least in part within the recess.

66.—The apparatus according to claim 64, wherein at least one of the slit and the lock lumen is shaped so as to define a distal portion that is wider than a proximal portion thereof.

67.—The apparatus according to claim 64, wherein the recess is shaped so as to define a proximal-most portion that is narrower than any other portion of the recess distal to the proximal-most portion.

68.—The apparatus according to any one of claims 55-67, wherein the annuloplasty structure comprises a housing, and wherein the housing is shaped so as to define the recess, the recess having a recess axis.

69.—The apparatus according to claim 68, wherein the lock is shaped so as to define a lock threaded portion, and wherein the housing is shaped so as to define an annuloplasty structure threaded portion configured to engage with the lock threaded portion.

70.—The apparatus according to claim 68, wherein the housing is shaped so as to define a contracting member lumen that is disposed at a non-zero angle with respect to the recess axis.

71.—The apparatus according to claim 70, wherein the housing is shaped so as to provide a contracting member lumen wall which is disposed along the contracting member lumen, and wherein when the lock is disposed within the recess, a distal end of the lock is configured to pinch a first portion of the contracting member against the contracting member lumen wall in order to lock the contracting member at least a first pinching point.

72.—The apparatus according to claim 71, wherein:
the recess is shaped so as to define a recess distal tapered portion,
the lock is shaped so as to define:
a lock lumen of the lock extending from a proximal opening in the lock toward a distal opening in the lock, and
a lock distal tapered portion,
the lock lumen is configured to surround the contracting member, and
when the lock is disposed within the recess, the recess distal tapered portion is configured to compress the lock distal tapered portion which, in turn, is configured to pinch a second portion of the contracting member within the lock lumen at the recess distal tapered portion in order to lock the contracting member at least a second pinching point.

73.—The apparatus according to any one of claims 55-72, further comprising a delivery tool, the delivery tool and the contracting member being slidable with respect to each other, the delivery tool being configured to deliver the annuloplasty structure to an annulus of a heart of a patient.

74.—The apparatus according to claim 73, wherein the delivery tool comprises a knob coupled to a proximal portion of the contracting member, the knob being configured to increase tension of the contracting member by pulling the contracting member proximally.

75.—The apparatus according to claim 73, wherein when the delivery tool is coupled to the annuloplasty structure, a portion of the contracting member is disposed within a lumen of the delivery tool and the lock surrounds a part of the contracting member.

76.—The apparatus according to claim 75, wherein when the delivery tool is coupled to the annuloplasty structure, the lock is disposed at least in part within the recess.

77.—The apparatus according to claim 75, wherein the delivery tool comprises a lock-ejector movable within a distal end portion of the delivery tool, and wherein movement of the lock-ejector contacts and converts the lock from an open state to a closed state to clamp onto the contracting member passed therethrough.

78.—The apparatus according to claim 77, wherein the distal end portion of the delivery tool is shaped so as to define a sharp edge, and wherein the contracting member is disposed in proximity to the sharp edge such that movement of the lock-ejector against the sharp edge severs the contracting member extending through the lock.

79.—Apparatus, comprising:

an implantable annuloplasty structure comprising:

a primary body portion; and

a contracting member having a (1) first portion extending along a longitudinal length of the primary body portion of the annuloplasty structure, and a (2) second portion extending away from the primary portion of the annuloplasty structure; and

a lock slidable along the contracting member, the lock being fixedly couplable to the contracting member in order to prevent movement of the contracting member, wherein:

the lock is shaped so as to define a slit which extends from a proximal surface of the lock toward a distal surface of the lock,

the lock defines a lock lumen of the lock extending from a proximal opening in the lock toward a distal opening in the lock,

the lock lumen is configured to surround the contracting member, and

when the lock is compressed, the slit enables the lock to close around the contracting member and thereby lock the lock to the contracting member.

80.—The apparatus according to claim 79, wherein the annuloplasty structure comprises a partial annuloplasty ring structure.

81. — ~~The apparatus according to any one of claims 79-80, wherein the annuloplasty structure is shaped so as to define a recess dimensioned so as to compress the lock when the lock is disposed at least in part within the recess.~~

82. — ~~The apparatus according to claim 81, wherein the lock is disposable at least in part within the recess.~~

83. — ~~The apparatus according to claim 81, wherein at least one of the slit and the lock lumen is shaped so as to define a distal portion that is wider than a proximal portion thereof.~~

84. — ~~The apparatus according to claim 81, wherein the recess is shaped so as to define a proximal portion that is narrower than any other portion of the recess distal to the proximal portion.~~

85. — ~~The apparatus according to claim 81, wherein the lock is shaped so as to define a lock threaded portion, and wherein the annuloplasty structure is shaped so as to define an annuloplasty structure threaded portion configured to engage with the lock threaded portion.~~

86. — ~~The apparatus according to claim 81, wherein the annuloplasty structure comprises a housing, and wherein the housing is shaped so as to define the recess, the recess having a recess axis.~~

87. — ~~The apparatus according to claim 86, wherein the lock is shaped so as to define a lock threaded portion, and wherein the housing is shaped so as to define an annuloplasty structure threaded portion configured to engage with the lock threaded portion.~~

88. — ~~The apparatus according to claim 86, wherein the housing is shaped so as to define a contracting member lumen that is disposed at a non-zero angle with respect to the recess axis.~~

89. — ~~The apparatus according to claim 88, wherein the housing is shaped so as to provide a contracting member lumen wall which is disposed along the contracting member lumen, and wherein when the lock is disposed within the recess, a distal end of the lock is configured to pinch a first portion of the contracting member against the contracting member lumen wall in order to lock the contracting member at least a first pinching point.~~

90. — ~~The apparatus according to claim 89, wherein:
the recess is shaped so as to define a recess distal tapered portion,
the lock is shaped so as to define:~~

~~a lock lumen of the lock extending from a proximal opening in the lock toward a distal opening in the lock, and~~

~~a lock distal tapered portion,~~

~~the lock lumen is configured to surround the contracting member, and~~

5 ~~when the lock is disposed within the recess, the recess distal tapered portion is configured to compress the lock distal tapered portion which, in turn, is configured to pinch a second portion of the contracting member within the lock lumen at the recess distal tapered portion in order to lock the contracting member at least a second pinching point.~~

10 91.—~~The apparatus according to any one of claims 79-90, further comprising a delivery tool, the delivery tool and the contracting member being slidable with respect to each other, the delivery tool being configured to deliver the annuloplasty structure to an annulus of a heart of a patient.~~

15 92.—~~The apparatus according to claim 91, wherein the delivery tool comprises a knob coupled to a proximal portion of the contracting member, the knob being configured to increase tension of the contracting member by pulling the contracting member proximally.~~

93.—~~The apparatus according to claim 92, wherein the knob is fixedly coupled to the proximal portion of the contracting member.~~

20 94.—~~The apparatus according to claim 91, wherein when the delivery tool is coupled to the annuloplasty structure, a portion of the contracting member is disposed within a lumen of the delivery tool and the lock surrounds a part of the contracting member.~~

95.—~~The apparatus according to claim 94,~~

~~wherein the annuloplasty structure is shaped so as to define the recess dimensioned so as to compress the lock when the lock is disposed at least in part within the recess, and~~

25 ~~wherein when the delivery tool is coupled to the annuloplasty structure, the lock is disposed at least in part within the recess.~~

96.—~~The apparatus according to claim 94, wherein the delivery tool comprises a lock-ejector movable within a distal end portion of the delivery tool, and wherein movement of the lock-ejector contacts and converts the lock from an open state to a closed state to clamp onto the contracting member passed therethrough.~~

30 97.—~~The apparatus according to any one of claims 91-96, wherein the distal end portion of the delivery tool is shaped so as to define a sharp edge, and wherein the contracting~~

~~member is disposed in proximity to the sharp edge such that movement of the lock ejector against the sharp edge severs the contracting member extending through the lock.~~

98. ~~Apparatus, comprising:~~

~~an implantable annuloplasty structure comprising:~~

~~a primary body portion; and~~

~~a contracting member having (1) a first portion extending along a longitudinal length of the primary body portion of the annuloplasty structure, and (2) a second portion extending away from the primary portion of the annuloplasty structure;~~

~~at least one contracting member fastener configured to surround the contracting member, the contracting member fastener comprising a clamping structure that (a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the contracting member passed therethrough, and (b) can be flexed to an open state through which the contracting member can move;~~

~~a stop removably coupled to the contracting member fastener and configured to maintain the contracting member fastener in the open state; and~~

~~a contracting member severing tool comprising:~~

~~a static cutting element having a first cutting surface; and~~

~~a dynamic cutting element having a second cutting surface that opposes the first cutting surface; and~~

~~one or more graspers configured to pull the stop proximally and remove the stop from the contracting member fastener, wherein:~~

~~a portion of the contracting member passes through the static cutting element and through the dynamic cutting element, and~~

~~once pulled proximally, the stop contacts the cutting element and is configured to push against and move the dynamic cutting element with respect to the static cutting element in order to facilitate severing of the contracting member.~~

99. ~~The apparatus according to claim 98, wherein the first and second cutting surfaces are each concave.~~

100. ~~The apparatus according to any one of claims 98-99, wherein the first and second cutting surfaces are each diagonal.~~

- ~~101.—The apparatus according to any one of claims 98-100, wherein the tool is arranged such that the tool provides a safety mechanism whereby movement of the dynamic cutting element with respect to the static cutting element is possible only with pushing of the stop against the dynamic cutting element.~~
- 5 ~~102.—The apparatus according to any one of claims 98-101, further comprising a housing that houses the fastener and the stop, and wherein the tool is coupled to the housing as the graspers grasp the stop.~~
- ~~103.—The apparatus according to claim 102, wherein the tool is configured to deliver the housing, the fastener, and the stop to the implantable annuloplasty structure.~~
- 10 ~~104.—The apparatus according to claim 102, wherein the implantable annuloplasty structure comprises the housing.~~
- ~~105.—The apparatus according to any one of claims 98-104, wherein the stop is shaped so as to define an overhang, and wherein the graspers are configured to grip the overhang in order to initially couple the tool to the fastener.~~
- 15 ~~106.—The apparatus according to claim 105, further comprising an outer sleeve portion configured to surround the graspers in order to lock the graspers with respect to the overhang.~~
- ~~107.—Apparatus, comprising:~~
- ~~a contracting member fastener configured to fasten to a contracting member;~~
- ~~at least one contracting member fastener configured to surround the contracting~~
- 20 ~~member, the contracting member fastener comprising a clamping structure that (a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the contracting member passed therethrough, and (b) can be flexed to an open state through which the contracting member can move;~~
- ~~a stop removably coupled to the contracting member fastener and configured to~~
- 25 ~~maintain the contracting member fastener in the open state; and~~
- ~~a contracting member severing tool comprising:~~
- ~~a cutting element configured to cut the contracting member; and~~
- ~~one or more graspers configured to pull the stop proximally and remove the stop from the contracting member fastener,~~

~~wherein once pulled proximally, the stop contacts the cutting element and is configured to push against and move the cutting element in order to facilitate severing of the contracting member by the cutting element.~~

5 ~~108.—The apparatus according to claim 107, wherein the tool is arranged such that the tool provides a safety mechanism whereby movement of the cutting element is possible only with pushing of the stop against the cutting element.~~

~~109.—The apparatus according to any one of claims 107-108, further comprising a housing that houses the fastener and the stop, and wherein the tool is coupled to the housing as the graspers grasp the stop.~~

10 ~~110.—The apparatus according to claim 109, further comprising an implantable annuloplasty structure, wherein the tool is configured to deliver the housing, the fastener, and the stop to the implantable annuloplasty structure.~~

15 ~~111.—The apparatus according to claim 109, further comprising an implantable annuloplasty structure, wherein the implantable annuloplasty structure comprises the housing.~~

~~112.—The apparatus according to any one of claims 107-111, wherein the stop is shaped so as to define an overhang, and wherein the graspers are configured to grip the overhang in order to initially couple the tool to the fastener.~~

20 ~~113.—The apparatus according to claim 112, further comprising an outer sleeve portion configured to surround the graspers in order to lock the graspers with respect to the overhang.~~

~~114.—Apparatus comprising:~~

~~an implant comprising an implantable structure and a flexible elongated contracting member that extends away from the implantable structure; and~~

25 ~~a contracting member uptake tool, which comprises a handle portion, which comprises:~~

~~an outer housing;~~

~~a tubular shaft disposed at least partially within the outer housing;~~

30 ~~an inner shaft, which (a) is partially disposed within a proximal longitudinal portion of the tubular shaft, such that the inner shaft is axially slidable with respect to the tubular shaft, (b) is shaped so as to define an inner shaft contracting member-receiving channel, and (c) comprises a lock, which is configured (i) when in an~~

~~unlocked state, to allow sliding of the contracting member with respect to the inner shaft contracting member receiving channel, and (ii) when in a locked state, to axially lock the contracting member with respect to the inner shaft;~~

~~a distal force applicator, which (a) is disposed at least partially within a distal longitudinal portion of the tubular shaft, and (b) is shaped so as to define a distal force applicator contracting member receiving channel, which allows sliding of the contracting member therethrough;~~

~~a spring, which is disposed within the tubular shaft, connecting the distal force applicator and a distal portion of the inner shaft; and~~

~~a contraction facilitating knob, which is accessible from outside the outer housing,~~

~~wherein the handle portion is shaped so as to define a handle contracting member receiving channel from a distal end through to a proximal end of the handle portion, wherein the handle contracting member receiving channel includes the inner shaft contracting member receiving channel and the distal force applicator contracting member receiving channel,~~

~~wherein the handle portion is configured such that actuation of the contraction facilitating knob, when the contracting member is disposed passing entirely through the handle contracting member receiving channel and the lock is in the locked state, causes the handle portion to uptake successive portions of the contracting member by:~~

~~advancing the tubular shaft proximally with respect to the outer housing,~~

~~which advances the distal force applicator proximally with respect to the outer housing,~~

~~which applies a proximally directed force to the spring,~~

~~which pushes the inner shaft proximally with respect to the outer housing,~~

~~which proximally pulls the contracting member, and~~

~~wherein the handle portion is configured such that upon the actuation of the contraction facilitating knob when the contracting member is disposed passing entirely through the handle contracting member receiving channel, the lock is in the locked state, and the contracting member is tensed:~~

~~the spring pushes the inner shaft proximally with respect to the outer housing to a lesser extent than the tubular shaft proximally advances with respect to the outer housing, and~~

~~proximal pulling of the contracting member by the inner shaft increases tension in the contracting member.~~

~~115.—The apparatus according to claim 114, wherein the contraction facilitating knob is configured to be actuated by rotation thereof.~~

5 ~~116.—The apparatus according to any one of claims 114, wherein the tubular shaft and the contraction facilitating knob are in threaded connection with each other, and~~

~~wherein the handle portion is configured such that actuation of the contraction facilitating knob rotates the tubular shaft, thereby advancing the tubular shaft proximally with respect to the outer housing.~~

10 ~~117.—The apparatus according to any one of claims 114–116, wherein the inner shaft partially protrudes out of a proximal end of the outer housing, and~~

~~wherein the tubular shaft and the inner shaft together provide a non-electrical mechanical force gauge, in which a relative axial position of the tubular shaft with respect to the inner shaft provides a visual indication of a measure of the tension in the contracting member.~~

15 ~~118.—The apparatus according to claim 117, wherein the inner shaft is marked with a plurality of fiduciary markers, which are arranged along the inner shaft to indicate the relative axial position of the tubular shaft with respect to the inner shaft.~~

20 ~~119.—The apparatus according to any one of claims 114–116, wherein the handle portion further comprises a tension limiting locking assembly, which is configured to axially lock the inner shaft with respect to the outer housing when the handle portion increases the tension in the contracting member to a predetermined threshold level, thereby limiting a maximum tension that the inner shaft can apply to the contracting member.~~

25 ~~120.—The apparatus according to claim 119, wherein the tension limiting locking assembly is configured to axially lock the inner shaft with respect to the outer housing when the tubular shaft is disposed at a predetermined relative axial position with respect to the inner shaft, thereby limiting the maximum tension that the inner shaft can apply to the contracting member.~~

121.—The apparatus according to claim 120, wherein the tension-limiting locking assembly comprises a detent, which is arranged to axially lock the inner shaft with respect to the outer housing when the tubular shaft is disposed at the predetermined relative axial position with respect to the inner shaft, thereby limiting the maximum tension that the inner shaft can apply to the contracting member.

122.—The apparatus according to claim 121, wherein the detent is coupled in axial fixation with the inner shaft and is configured to move radially outward so as to engage the outer housing in order to axially lock the inner shaft with respect to the outer housing.

123.—The apparatus according to claim 122,

wherein the tension-limiting locking assembly further comprises a plurality of indentations that the outer housing is shaped so as to define,

wherein the detent is engageable with the indentations to axially lock the inner shaft with respect to the outer housing, and

wherein the handle portion is arranged such that the particular one of the indentations with which the detent engages depends upon a relative axial position of the inner shaft with respect to the outer housing when the tubular shaft is disposed at the predetermined relative axial position with respect to the inner shaft.

124.—The apparatus according to claim 122, wherein the proximal longitudinal portion of the tubular shaft is shaped so as to define an elongate opening through which the detent passes when the detent axially locks the inner shaft with respect to the outer housing.

125.—The apparatus according to claim 124, wherein the tubular shaft comprises one or more tracks that run alongside a longitudinal portion of the elongate opening and are arranged to:

(a)—prevent the detent from axially locking the inner shaft with respect to the outer housing when the tubular shaft is disposed distally to the predetermined relative axial position with respect to the inner shaft, and

(b)—allow the detent to axially lock the inner shaft when the tubular shaft is disposed at the predetermined relative axial position with respect to the inner shaft.

126.—The apparatus according to claim 125, wherein the one or more tracks are shaped so as to define one or more respective sloping portions, such that after the detent axially locks the inner shaft with respect to the outer housing when the tubular shaft is disposed at the predetermined relative axial position with respect to the inner shaft, subsequent distal motion

of the tubular shaft and consequently the one or more tracks with respect to the inner shaft disengages the detent from the outer housing.

~~127.—The apparatus according to claim 119,~~

~~wherein the inner shaft partially protrudes out of a proximal end of the outer housing,~~

~~and~~

~~wherein the tubular shaft and the inner shaft together provide a non-electrical mechanical force gauge, in which a relative axial position of the tubular shaft with respect to the inner shaft provides a visual indication of a measure of the tension in the contracting member.~~

~~128.—The apparatus according to any one of claims 114-116, wherein the implantable structure comprises an implantable annuloplasty structure.~~

~~129.—The apparatus according to claim 128, wherein the implantable annuloplasty structure comprises a flexible sleeve, and wherein the contracting member extends along and away from the sleeve.~~

~~130.—Apparatus comprising:~~

~~an implant comprising an implantable structure and a flexible elongated contracting member that extends away from the implantable structure; and~~

~~a contracting member uptake tool, which comprises a handle portion, which (a) is shaped so as to define a handle contracting member receiving channel from a distal end through to a proximal end of the handle portion, and (b) comprises:~~

~~an outer housing;~~

~~a non-electrical mechanical force gauge;~~

~~a lock, which is configured (i) when in an unlocked state, to allow sliding of the contracting member with respect to the force gauge, and (ii) when in a locked state, to axially lock the contracting member with respect to an axially movable portion of the force gauge, wherein the axially movable portion of the force gauge is axially movable with respect to the outer housing; and~~

~~a contraction facilitating knob, which is accessible from outside the outer housing,~~

~~wherein the handle portion is configured such that actuation of the contraction facilitating knob, when the contracting member is disposed passing entirely through the handle contracting member receiving channel and the lock is in the locked state, causes the~~

~~handle portion to uptake successive portions of the contracting member by advancing the force gauge proximally with respect to the outer housing so as to proximally pull the contracting member,~~

~~wherein the handle portion is configured such that upon the actuation of the contraction facilitating knob when the contracting member is disposed passing entirely through the handle contracting member receiving channel, the lock is in the locked state, and the contracting member is tensed, proximal pulling of the contracting member by the axially-movable portion of the force gauge increases tension in the contracting member, and~~

~~wherein the force gauge is configured to provide a visual indication of a measure of the tension in the contracting member.~~

~~131.—The apparatus according to claim 130, wherein the force gauge comprises a spring.~~

~~132.—The apparatus according to claim 131, wherein the force gauge is configured such that the spring applies a proximally directed force to the axially-movable portion of the force gauge.~~

~~133.—The apparatus according to any one of claims 130-132, wherein the handle portion further comprises a tension limiting locking assembly, which is configured to axially lock the axially-movable portion of the force gauge with respect to the outer housing when the handle portion increases the tension in the contracting member to a predetermined threshold level, thereby limiting a maximum tension that the axially-movable portion of the force gauge can apply to the contracting member.~~

~~134.—A method, comprising:~~

~~advancing toward a simulated heart of a patient an implantable annuloplasty structure including:~~

~~a primary body portion; and~~

~~a contracting member having (1) a first portion extending along a longitudinal length of the primary body portion of the annuloplasty structure, and (2) a second portion extending away from the primary portion of the annuloplasty ring structure; and~~

~~threading the second portion of the contracting member through a contracting member uptake tool, the contracting member uptake tool including:~~

~~a primary tube terminating at a distal end portion of the contracting member-uptake tool, the distal end portion of the contracting member-uptake tool having a distal tip;~~

~~a secondary tube disposed alongside the primary tube, the secondary tube having a secondary tube lumen being configured for passage therethrough of the contracting member; and~~

~~a contracting member snare comprising a distal snare portion and an elongate flexible body portion coupled to the distal snare portion, the distal snare portion being configured to ensnare a portion of the contracting member and being sized to pass through the secondary tube lumen of the secondary tube in order to pull the second portion of the contracting member through a length of the secondary tube, wherein threading comprises:~~

~~using the distal snare portion, ensnaring the portion of the contracting member;~~

~~using the contracting member snare, pulling the portion of the contracting member through the secondary tube; and~~

~~subsequently to the threading, advancing the contracting member-uptake tool along the contracting member toward the annuloplasty structure.~~

~~135.—The method according to claim 134, wherein pulling the portion of the contracting member through the secondary tube comprises pulling the second portion of the contracting member through the distal tip of the contracting member-uptake tool and subsequently through the length of the secondary tube.~~

~~136.—The method according to any one of claims 134-135, further comprising, subsequently to the advancing of the contracting member-uptake tool, contracting the annuloplasty structure using the contracting member-uptake tool.~~

~~137.—The method according to claim 136, further comprising using a sharp edge of the contracting member-uptake tool to sever the contracting member.~~

~~138.—A method, comprising:~~

~~advancing toward a simulated heart an implantable annuloplasty structure comprising:~~

~~a primary body portion;~~

~~a contracting member having (1) a first portion extending along a longitudinal length of the primary body portion of the annuloplasty structure, and (2) a second portion extending away from the primary body portion of the annuloplasty structure; and~~

~~a housing coupled to the primary body portion of the annuloplasty structure; a contracting member fastener disposed within the housing, the contracting member fastener comprising a clamping structure that (a) is biased toward assuming a closed state, in the closed state, the clamping structure is configured to clamp onto the contracting member passed therethrough, and (b) can be flexed to an open state through which the contracting member can move; and~~

~~a stop removably coupled to the fastener and configured to maintain the contracting member fastener in the open state; and~~

~~converting the contracting member fastener from the open state to the closed state in order to clamp onto the contracting member passed therethrough by moving a fastener-ejector engageable with the stop such that movement of the fastener-ejector moves the stop removably coupled to the fastener.~~

~~139.—The method according to claim 138, further comprising, subsequently to the advancing, contracting the annuloplasty structure using the contracting member, and wherein converting the contracting member fastener from the open state to the closed state comprising converting subsequently to the contracting.~~

~~140.—The method according to claim 139, wherein contracting the annuloplasty structure comprises contracting the annuloplasty structure using a contracting member uptake tool and further comprising, subsequently to the converting of the contracting member fastener from the open state to the closed state, using a sharp edge of the contracting member uptake tool, severing the contracting member.~~

~~141.—A method, comprising:~~

~~advancing toward a simulated heart an implantable annuloplasty structure including:~~

~~a primary body portion having a lateral wall; and~~

~~a contracting member having (1) a first portion extending along a longitudinal length of the primary body portion of the annuloplasty structure, and (2) a second portion extending away from the primary body portion of the annuloplasty structure;~~

~~the contracting member being configured to adjust a perimeter of the annuloplasty structure,~~

~~the primary body portion of the annuloplasty structure being shaped to define a recess having a recess axis, the recess extending from an opening in a first surface of the lateral wall of the primary body portion toward an opposite second surface of the lateral wall of the primary body portion, the lateral wall of the primary body portion extending away from the recess along a longitudinal axis that is at a non-zero angle with respect to the recess axis, the contracting member extending through the recess and away from the primary body portion of the annuloplasty structure via the recess; and~~

~~locking the contracting member by sliding a lock along the contracting member to fit within the recess, the lock being fixedly couplable to the contracting member in order to prevent movement of the contracting member, the recess being shaped so as to facilitate fixed coupling of the lock to the contracting member.~~

~~142.—The method according to claim 141, wherein advancing comprises advancing the annuloplasty structure using a delivery tool, and wherein the method further comprises sliding the delivery tool and the contracting member with respect to each other.~~

~~143.—A method, comprising:~~

~~threading a contracting member severing tool along a contracting member, the contracting member severing tool including a cutting element in proximity with the contracting member during the threading;~~

~~engaging the tool with a stop that is removably coupled to a contracting member fastener surrounding a portion of the contracting member, the stop being configured to maintain the contracting member fastener in an open state;~~

~~using the tool, disengaging the stop from the contracting member fastener by pulling the stop with the tool; and~~

~~by the pulling, contacting the stop with the cutting element and facilitating pushing of the stop against the cutting element, and by the pushing, facilitating moving of the cutting element, and thereby facilitating severing of the contracting member by the cutting element.~~

~~144.—The method according to claim 143, wherein the tool is arranged such that the tool provides a safety mechanism whereby the moving of the cutting element is possible only by the pushing of the stop against the cutting element.~~

~~145.—The method according to any one of claims 143–144, further including a housing that houses the fastener and the stop, and wherein the method comprises coupling the tool to the housing by grasping the stop with the tool.~~

~~146.—The method according to claim 145, further comprising, using the tool, delivering the housing, the fastener, and the stop to an implantable annuloplasty structure, wherein the stop is shaped so as to define an overhang, and wherein engaging the tool with a stop comprises initially coupling the tool to the fastener by gripping the overhang with the tool with graspers.~~

~~147.—A method comprising:~~

~~advancing toward a simulated heart an implantable structure of an implant and a flexible elongated contracting member that extends away from the implantable structure;~~

~~threading a portion of the contracting member through a handle contracting member-receiving channel of a handle portion of a contracting member uptake tool, which further includes:~~

~~an outer housing,~~

~~a non-electrical mechanical force gauge,~~

~~a lock, which is configured (i) when in an unlocked state, to allow sliding of the contracting member with respect to the force gauge, and (ii) when in a locked state, to axially lock the contracting member with respect to an axially movable portion of the force gauge, wherein the axially movable portion of the force gauge is axially movable with respect to the outer housing, and~~

~~a contraction facilitating knob, which is accessible from outside the outer housing;~~

~~transitioning the lock from the unlocked state to the locked state;~~

~~thereafter, actuating the contraction facilitating knob to cause the handle portion to uptake successive portions of the contracting member by advancing the force gauge proximally with respect to the outer housing so as to proximally pull the contracting member;~~

~~thereafter, once the contracting member is tensed, actuating the contraction facilitating knob to increase tension in the contracting member by proximal pulling of the contracting member by the axially movable portion of the force gauge; and~~

~~viewing a visual indication of a measure of the tension in the contracting member, the visual indication provided by the force gauge.~~

148.—~~The method according to claim 147, wherein the handle portion further includes a tension-limiting locking assembly, which is configured to axially lock the axially movable portion of the force gauge with respect to the outer housing when the handle portion increases the tension in the contracting member to a predetermined threshold level, thereby limiting a maximum tension that the axially movable portion of the force gauge can apply to the contracting member.~~